hemoglobin was 88 per cent., and the leukocytes 25,800. The temperature varied up to 103°, and the pulse up to 132. The urine has a specific gravity of 1015 to 1031, revealed a faint trace of albumin, but no sugar and no casts.

On January 11 Dr. Deaver operated. On opening the peritoneum considerable pus was evacuated. The appendix was found acutely inflamed, perforated, and adherent to the colon; it was removed. The patient made an uneventful recovery, and was discharged on the thirtieth day after operation with a granulating wound.

The following are the notes of the examination of the appendix (No. 4609): The appendix is 6 cm. long and from 0.6 to 1.5 cm. in thickness. There is marked injection of the vessels of the serosa. The tip is much dilated—the lumen to 0.8 mm. in diameter, and contains a hard calculus; here the wall is reduced to 3 to 4 mm., the mucosa is rough, ulcerated, and reveals small foci of hemorrhage. Elsewhere the lumen is variously dilated and constricted, the mucosa roughened, and shows foci of hemorrhage. (The newgrowth was not detected macroscopically, and even after it had been found microscopically there was nothing to suggest its presence to the unaided eye.) Microscopically the appendix reveals slightly increased fibrosis of the submucosa and muscularis, and the ordinary phenomena of acute inflammation: vascular dilatation, œdema, cellular infiltration, foci of hemorrhage, shedding of the epithelium, etc. The newgrowth is limited to the dilated peripheral extremity of the organ, and is almost if not quite annular. It consists of nests of cells supported by a well-developed connective-tissue stroma, obviously, in part, at least, remains of the submucosa; the mucosa is almost if not quite missing. There is a moderate infiltration also of the muscularis, especially near the subserosa. As a rule, the nests of cells are very large. The individual cells are epithelial in type, of moderate size, polyhedral in shape, and have clear vesicular nuclei that stain well.

Diagnosis. Carcinoma of the appendix; acute ulcerative appendicitis with perforation.

THE SURGICAL ASPECTS OF DUPUYTREN'S CONTRACTION.

By Raymond Russ, M.D.,
INSTRUCTOR IN SURGERY IN THE UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, CALIFORNIA.

With the expansion and better grouping of surgical knowledge, there is a strong tendency to do away with the names of those surgeons who have first described conditions or who have been indubitably associated with them. However wise such a procedure may be from the scientific standpoint, one who is interested in the history of surgery cannot but regret the change. But there are some conditions to which the names of their investigators are tightly forged, and I have no doubt that in the years to come the name of the great French surgeon, whose strong convictions and firm insistence first compelled a hearing, will be associated with contraction of the palmar fascia. Basing his beliefs on the dissection of a case, he proclaimed his findings in 1831,[1] and with that self reliance and personal assurance which was so characteristic of him, showed the falsity of the then current opinion that the deformity was due to the contraction of the tendons. In his "Leçons Orales," in 1832, and his lectures, delivered in 1833, he reiterated time after time his beliefs, winning acceptance by the force of his persuasion. Henry Cline, in his lectures of 1808, and Sir Astley Cooper, a little later, allude to the true character of the deformity, but their opinions were not backed by pathological observations.

An extensive literature has grown up around Dupuytren's first dissection, which has served to confirm and expand his principles. Although the contraction is fairly common, the subject is treated so briefly, and many times incorrectly, in our surgical treatises, that I have thought it advisable to review the main facts in the anatomy, pathology, and etiology of the disease before proceeding to discuss its radical treatment.

The onset of Dupuytren's contraction is most interesting. A middle-aged or elderly man will notice that his ring- or little finger is somewhat stiff, and will often assign the cause to rheumatism, with which he may have been previously afflicted. Local pain may be slight or entirely wanting, but he finds that extension of the affected part is in some way impeded. As the months pass and the condition does not improve he may notice that there is a slight puckering of the skin over the metacarpophalangeal joint, as if a subcuticular suture had been gradually tightened. Later, small and hard nodules appear, and the hills and valleys, which have been noticeable in the palm, become more marked. The disease proceeds insidiously; the joints gradually increase their flexion, and there are seen in the palm, along the lines of the flexor tendons to the affected fingers, hard, unyielding bands, to which the skin seems to be most intimately attached. A long period of time has elapsed since the first symptoms, and the trouble may now be spreading to adjacent fingers, which, in turn, begin to contract; the palmar bands become more noticeable, and the furrows between them deepen. Flexion may be so pronounced that the finger-nails press into the flesh of the palm, and the patient's condition is pitiable. Forcible extension is impossible, and the contracted, deformed hand is of little or no service.

---

[1] Journal universal et hebdomadaire de médecine et de chirurgie pratiques, Paris, 1831.

To Adams,[2] who first brought the pathology and surgical treatment into general notice in England, and to Keen,[3] who performed a similar service in this country, we owe much. From the statistics of Keen (23 personal cases and 95 cases from the literature), Noble Smith[4] (70 cases), and Nichols[5] (50 cases), we may deduce the following facts: The disease occurs in men of all classes and generally after the fortieth year. It is met with but seldom in women, and Adams states that he considers it about ten times as common among men. The two hands are attacked in nearly equal proportion, the disease showing a decided preference for the ulnar side, originating in the ring or little finger or in both. Its hereditary character is worthy of mention. Adams has noted it in several cases, and Keen found it in nearly one-third of the records. Adams has stated that the disease is largely due to gout, and Keen has emphasized the fact that it is found connected with a gouty or rheumatic history. Smith states that his inquiries were against these conditions being the cause, while Nichols fails to find that the disease is a manifestation of, or results from, rheumatism. In many cases the hands are affected symmetrically. Of its frequency we have various testimony, but the largest statistics have been compiled by William Anderson.[6] He states that of 2600 adults of the poorer classes in English infirmaries, about five-sixths of whom were over middle age, 33 (1.27 per cent.) were affected.

If we make a careful dissection of the fingers and palm, we find that directly under the skin and above the fascia proper is a dense layer of fibro-areolar tissue, the superficial palmar fascia, perhaps more marked on the ulnar side of the palm than elsewhere, and extending well up on the fingers. The fibers are thin, but very strong, and they form a sort of web, which is everywhere filled by fatty tissue. Traversing this layer are a very great number of strong fibers which closely bind the skin to the fascia below, and are best appreciated by the dissector by the gritty feel which they impart to the scalpel. These are particularly noticeable upon the ulnar side. This cross fibrous layer is not emphasized in our anatomies, but its bearing on Dupuytren's contraction is most important. It will be remembered that the contraction first involves the ulnar surface of the hand.

Below this there is the deep palmar fascia, satisfactory descriptions of which are given in our anatomical text-books. Arising

[2] Observations on Contractions of the Fingers, London, 1892. Remarks on the Contraction of the Fingers, Proc. Med. Soc. London, 1879–81, v, p. 132. Dupuytren's Contraction of the Fingers in Women, Brit. Med. Jour., 1882, i, 84.

[3] Etiology and Pathology of Dupuytren's Contraction of Palmar Fascia, Proc. Phila. Co. Med. Soc., 1881–82, iv, 108; also Phila. Med. Times, 1881–82, xii, 370.

[4] Brit. Med. Jour., March 29, 1884, p. 603.

[5] A Clinical Study of Dupuytren's Contraction of the Palmar and Digital Fascia, AMER. JOUR. MED. SCI., 1899, cxvii, 285. Histology of Dupuytren's Contraction of Palmar Fascia, Med. News, 1889, lxxv, 491.

[6] Deformities of the Fingers and Toes, London, 1897.

above from the annular ligament and the palmaris longus muscle, it spreads fanlike over the palm, its firm, fibrous bundles being inserted into the lateral margins of the anterior ligaments of the metacarpophalangeal joints of the four fingers. Some fibers, however, go to the bases of the first phalanges, while others go to their sides and reach down even to the second and third phalanges. Besides these, there are median fibers extending down each finger to the base of the second phalanx.

To the surgeon who performs an open operation for the relief of this contracture, certain of these bands lying in the axes of the fingers appear as large, firm, and very resistant cords stretched tightly across the palm, as is stretched the string to a bow. Above these fibers the subcuticular tissue is very thin or entirely lacking, and so thick are these cords at times that they often have been mistaken for the flexor tendons. This is an error which the best of surgeons have made, and is commented upon by all those who have written extensively of the operative interference. There is no doubt that, in some operations, after the skin has been carefully dissected away from the bands and the fingers fairly well freed, by incisions along their surfaces, the large bands of the offending fascia have been left in situ. If the operator will but go a little deeper, he will find the flexor tendons lying in their sheaths. Again, the fibrous bands will at once be recognized from the fact that they are inserted on the base and sides of the first phalanx. This is not the case with the tendon; it does not divide here, neither does it have an attachment to the first phalanx. Again, the finger tips may be inserted beneath the bands, whereupon the movements of the flexor tendons are readily appreciated.

Microscopic examinations have been made by a number of observers, notably Richer,[7] Chevrot,[8] Langhans,[9] Anderson,[10] and Nichols,[11] and the following facts observed: The stratum corneum has been found by some to be thickened, while others have denied skin changes. It is probable that they do not take place, if at all, until late in the disease. The contracted bands are found to consist of very dense and firm fasciculi longitudinally arranged. They are, in general, similar to the normal fascia, which may lie adjacent to them, the bands being but a hypertrophy of a circumscribed tract. In cases in which the contraction is fairly recent, these fasciculi are well mixed with connective tissue elements and bloodvessels, but in cases in which the contraction has extended over a period of years these fasciculi are fused into a homogeneous mass and the cellular and vascular elements, which were earlier present, have entirely disappeared.

---

[7] Progress médicale, Paris, 1877, v, 369.

[8] Recherches sur la rétraction à l'aponeurose palmaire, Paris, 1882, p. 21.

[9] Quoted in Brit. Med. Jour., January 10, 1891, p. 62.

[10] Loc. cit.

[11] Loc. cit.

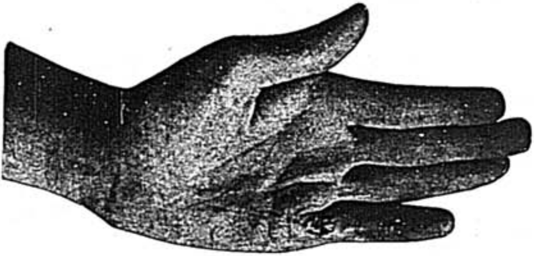
While this picture points to a definite hypertrophy, its causation is obscure and has led to much speculation. Dupuytren held the opinion that the disease resulted from slight local traumas, and there are certain facts to be mentioned in favor of this view, and others against it. Adams and Keen gave gout a prominent place in the etiology, while many have thought that rheumatism lay at the bottom of the trouble. Still others have placed the disease among the nervous disorders, and their claims will be set forth later.

In the instances of the contraction which have come under my notice I have seldom failed to elicit some history of trauma. In some cases the trauma has been severe; in others, but slight. Habitual contracture, as in handling a shovel or driving a team, has been now and then complained of. The traumas were of the most varied kinds, and, feeling that there is a strong tendency on the part of patients to find an outward and material cause to account for such deformities, I have not laid much stress on these portions of their histories.

Recently, however, I have operated on a case of contracted fascia in which the history of trauma was most perfect and in which the evidences of trauma are still present. The patient, an intelligent man of forty-two, is firmly convinced as to the origin of his trouble. He has worried much over it, and has carefully watched the progress of the disease. The account which he gives of its onset and its gradual development is most complete. He states that it dates from four years ago, when he received an abrasion over the metacarpophalangeal joint of the little finger, left hand, while lifting some heavy timber in a mine, work to which he was unaccustomed. A calloused surface formed, which soon peeled off; the part has never healed properly, and has since remained a constant source of irritation. About two months after the beginning of his trouble he noticed that he could not fully extend his finger, and that there were a few hard nodes contiguous to the abrasion, lying in the palm in the axis of the little finger. These coalesced into a cord, and at the time of operation this fibrous band was sharply marked upon the surface, the skin over it being elevated and firmly adherent to it. The finger was contracted almost to a right angle, and the last phalanx was flexed to its full extent, resting closely upon the second. The patient was of the opinion that some grit or fine gravel had been ground into the hand, and cautioned me carefully at the time of operation to look for such foreign material at the site of the abrasion. He bears no evidence of the existence of the disease in the other hand. His general health is very good, and he has never suffered from gout or rheumatism. The accompanying photograph was taken three weeks after operation. The scar in the palm is hardly noticeable, but the abrasion remains the same as before.

Another patient, on whom I operated some two years ago, was a dishwasher by occupation, and he came to me for amputation of his ring finger, it being tightly flexed in the palm of his hand, due to contraction of the palmar fascia. The disease was of some four years' standing. Paronychia and excoriations and abrasions on the palms and fingers are common in this class of subjects, and the patient bore the marks of his occupation. He stated that his hands were habitually sore and tender.

Such a history as this is suggestive, but does not make an impression like the first case. Out of 50 cases examined, Nichols[12] found 15 which could be associated with more or less recent irritation or trauma. It is generally held by the older writers on the subject that gout and rheumatism are important factors in the etiology. Subsequent investigations have failed to verify this opinion, and personally I have not been able to trace any of my cases to such a causation.



Dupuytren's contracture apparently of traumatic origin. Photograph taken three weeks after the operation. Note the calloused surface at the metacarpophalangeal joint.

Of the nervous origin of Dupuytren's contraction much can be said, and it is at present the popular theory. Certainly the tingling and prickling sensations which are sometimes present in beginning cases are suggestive of the paresthesias of nerve lesions. Again, the fact that undoubted cases of heredity have existed is a difficult one to combat from the standpoint of simple trauma. We have no explanation to offer of the truth that it occurs on the ulnar side of the hand unless, as has been claimed, it arises from the fact that the skin is not as thick here, thus exposing the fascia to insult. Such an explanation seems hardly warranted. The condition of the fascia on this side has been commented on in considering the anatomy, but while it has a most important bearing on the clinical picture, we are not justified in going so far as to connect it with the etiology. That the disease is so often bilateral is certainly a strong point in favor of its nervous origin. Recently there has been a reaction against the nervous theory, and Ledderhose[13] believes that the beginning of the disease is an inflammatory proliferative process in the aponeurosis, and that subsequent trauma leads to the formation of nodules and finally to retraction.

---

[12] Loc. cit.

The age of onset, which is generally past middle life, has been given as an argument for the nervous origin of the disease, and those who believe in a traumatic origin can only cite in rebuttal the disappearance of subcuticular fat with advancing years. If we grant that the condition is due to trauma alone we shall be obliged to admit that it should be met with much more frequently. As in other conditions, we cannot overlook an hereditary tendency or a predisposition on the part of the tissues. Taking this into account, Myrtle[14] has argued that, as in manual labor the skin becomes much thickened, this cause, an irritative hyperplasia, is competent to affect the underlying fascia.

It is probable that no single factor can satisfactorily cover the etiology, and it is interesting here to note Abbé's[15] theory of the origin of the disease: a slight traumatism, then a spinal impression produced by this peripheral irritation, following which comes a reflex disturbance at the seat of trauma, an insensible hyperemia, and pathological changes in the fascia.

From the consideration of the various degrees of the contraction, it is at once evident that no one method of operative interference will apply to all cases, and that the surgeon must adapt his procedure to the particular problem which confronts him. As one looks over the literature, he is struck by the excellent results and the wide range of application of the method of subcutaneous incision. This procedure, which was introduced in England by Adams and popularized in this country by Keen and Abbé, consists in dividing the contracting bands by many subcutaneous sections, a knife with a very narrow blade (Mr. Adams employing a blade of $\frac{1}{16}$ inch width) being used. It was necessary in severe cases to make many such incisions, Adams in one instance having used eighteen, and Abbé twenty-five. Such a method is difficult; it requires an accurate knowledge of the pathology of the disease and the anatomical topography, and, moreover, it does not appeal to our present ideas of surgical thoroughness. Yet the excellent results reported by the method in the hands of a number of observers, many of the cases having been followed over a period of years, show the curative value of operation and what great success may follow an incomplete procedure.

The operations which have been performed by those who have favored the open method have been characterized by long incisions or the making of extensive flaps in order to facilitate the complete removal of the offending fascia. Some have advocated the total excision of the skin of the palm, allowing the wound to granulate, or have sought to fill this extensive denudation by skin grafts or by a large flap taken from the back of the hand. Others have adopted a V-shaped incision, the angle of the V pointing toward the forearm, and, as such a flap is almost certain to slough, it has generally been excised at the time of operation. Parallel incisions have also been made, one on each side of the offending band, and the fibrous structure and the skin overlying it excised. Reviewing these radical operations, it is evident that here, as in so many other instances, the surgical pendulum has swung to its extreme in the opposite direction. We should not forget the good results reported by many observers with the subcutaneous operation and the fact that Adams, who probably had the largest experience in this field, has made the statement that the method is applicable in the severest cases. In extreme conditions a sacrifice of skin may become necessary, but such cases are not frequent. When the cords are very pronounced it will be found that the subcuticular fat has entirely disappeared, and the fibrous fascia is strongly adherent to the skin. Yet the skin can be saved by careful dissection.

---

[13] Quoted in von Bergmann's Surgery.

[14] Dupuytren's Contraction of the Fingers, Brit. Med. Jour., 1881, ii, 894.

[15] On Dupuytren's Finger Contraction, its Nervous Origin, N. Y. Med. Jour., 1884, xxxix, 436; Further Remarks on Theory of its Nervous Origin, Med. Rec., 1888, xxxiii, 236.

I have begun my operation upon the contracted fingers instead of the palm. The parts being thoroughly cleansed, small incisions, running in the axes of the fingers, are made with a straight, sharp-pointed bistoury on the palmar surface and directly over the affected joints. An incision of 1 cm. or less is all that is necessary, except in very severe contractions. The skin and what subcuticular fat is present is then carefully dissected back on both sides, when the long fibrous bands will be seen. These are excised, and an endeavor then made to straighten the affected finger. This will usually not be possible, and it will be found necessary to pass the knife down deeply around the joint, the other hand serving as a guide outside, so as not to buttonhole the skin. A gritty feel warns the operator when he has arrived at the lateral fibers, which sometimes run nearly as far back as the extensor tendons. These are in turn divided. If the joint be a terminal one, and the bone has not become hypertrophied, it can now be brought to full extension. The same statement generally applies to the first phalangeal joint, but at the metacarpophalangeal articulation it will be necessary to cut the lateral insertions of the deep palmar fascia. These lateral insertions will have become changed into heavy cords, which are strongly adherent about the joint, while other thick fibers run to the sides of the phalanx. Besides these structures there will generally be a median cord, which must be excised. This, if present, will be firmly adherent to the skin over the joint and the shaft of the phalanx.

The fingers are now quite free, and it remains for the operator to remove the heavy fibrous bands which run in their respective axes. This can be accomplished through comparatively short incisions, which I prefer to make slightly to the side of the summit of each band. The skin is then undermined on all sides, and it is surprising how much can be done through a small opening if the surgeon be possessed with the necessary patience and if he exert a proper amount of care. The band being freed, it is excised. In beginning cases portions of glistening palmar fascia, macroscopically as yet unchanged, are seen in the vicinity of the bands; these should be removed as thoroughly as possible. The palm should now be placed upon the stretch and carefully examined for other points of contraction. Bleeding is generally considerable; I prefer to control it, with this method of small incisions, by an Esmarch bandage about the wrist, being careful that hemorrhage has absolutely ceased before suturing. The edges of the wound are coapted by a through-and-through continuous suture of fine silk.

The fingers are placed in extension upon a dorsal wooden splint. Passive movements should be begun as early as possible; I have removed the splint and made these movements as early as the sixth day. The splint is omitted after the tenth day. The endeavor should be to perform the work thoroughly through a small incision, for operative wounds of the hands often do not heal kindly, and a large resulting cicatrix will not only be unsightly but may limit motion. I have done the operation under local cocaine anesthesia, but with the above technique I prefer a general anesthetic. Anesthesia for a period of a half-hour may be obtained by infiltrating the median and ulnar nerves with a 2 per cent. cocaine solution.

The method which I have here described is, in general, one which has often been employed, but I have outlined it in order to emphasize the fact that it is possible to perform the operation through smaller incisions than have heretofore generally been used.

TORSION OF APPENDICES EPIPLOICÆ AND ITS CONSEQUENCES.

By Wallace A. Briggs, M.D.,
of Sacramento, California.

Although the anatomical nature of appendices epiploicæ has been thoroughly discussed, and loose bodies, or corpora aliena, in the abdominal cavity or in hernial sacs, resulting from torsion of their pedicles, have been reported at autopsy in quite a number of instances, until quite recently very little was known of their pathology. One of the earliest references to the pathological importance of appendices epiploicæ and their corpora aliena is contained in the